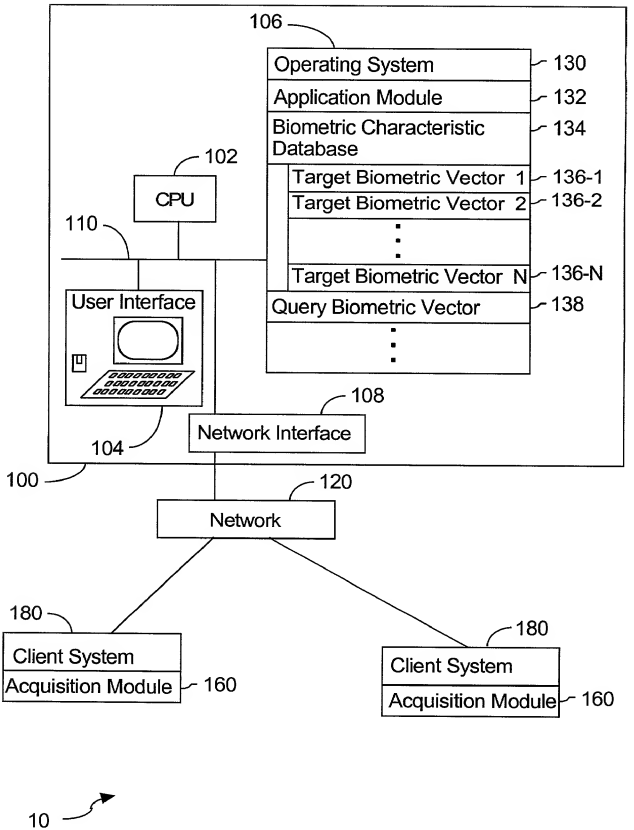
106
Operating System
130
Application Module
132
Biometric Characteristic Database
134
102
CPU
Target Biometric Vector 1
136-1
Target Biometric Vector 2
136-2
110
Target Biometric Vector N
136-N
User Interface
Query Biometric Vector
138
108
Network Interface
104
100
120
Network
180
Client System
Acquisition Module
160
180
Client System
Acquisition Module
160
10

FIG. 1

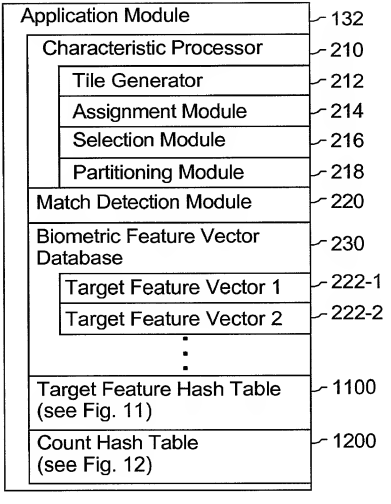
Application Module
132
Characteristic Processor
210
Tile Generator
212
Assignment Module
214
Selection Module
216
Partitioning Module
218
Match Detection Module
220
Biometric Feature Vector Database
230
Target Feature Vector 1
222-1
Target Feature Vector 2
222-2
Target Feature Hash Table (see Fig. 11)
1100
Count Hash Table (see Fig. 12)
1200

FIG. 2

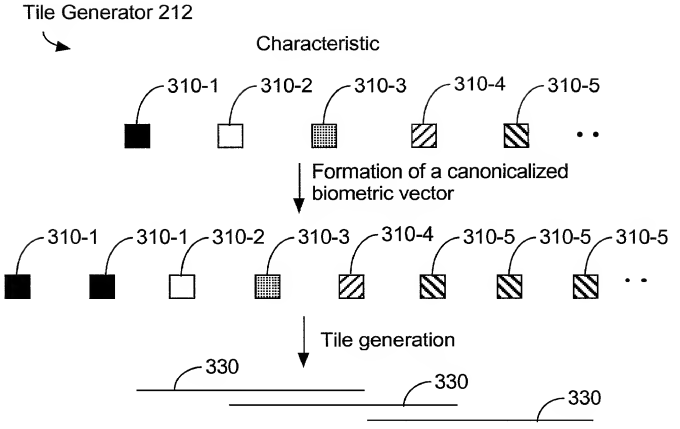
Tile Generator 212
Characteristic
310-1
310-2
310-3
310-4
310-5
Formation of a canonicalized biometric vector
310-1
310-1
310-2
310-3
310-4
310-5
310-5
310-5
Tile generation
330
330
330

FIG. 3

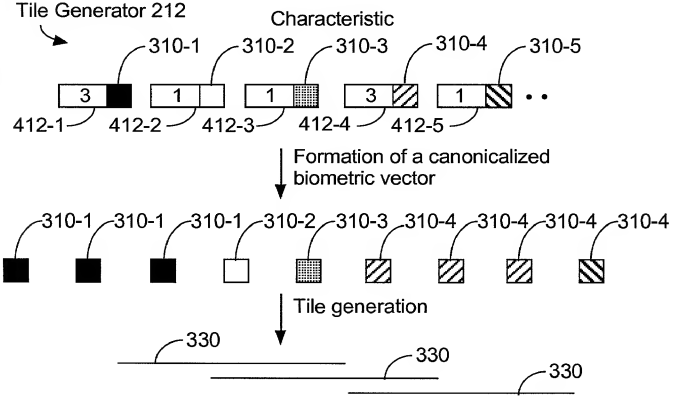
Tile Generator 212
Characteristic
310-1
310-2
310-3
310-4
310-5
3
1
1
3
1
412-1
412-2
412-3
412-4
412-5
Formation of a canonicalized biometric vector
310-1
310-1
310-1
310-2
310-3
310-4
310-4
310-4
310-4
Tile generation
330
330
330

FIG. 4

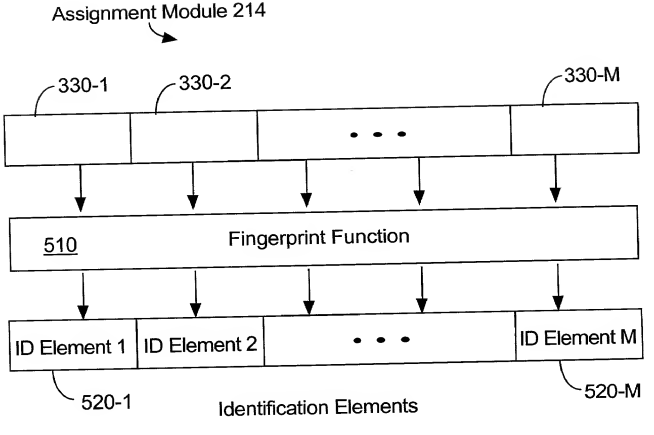
Assignment Module 214
330-1
330-2
330-M
510
Fingerprint Function
ID Element 1
ID Element 2
ID Element M
520-1
520-M
Identification Elements

FIG. 5

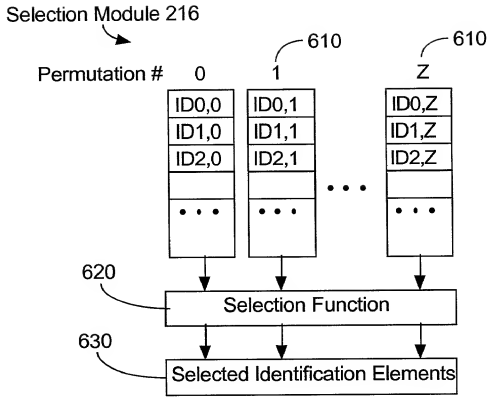
Selection Module 216
610
610
Permutation # 0
1
Z
ID0,0
ID1,0
ID2,0
ID0,1
ID1,1
ID2,1
ID0,Z
ID1,Z
ID2,Z
620
Selection Function
630
Selected Identification Elements

FIG. 6

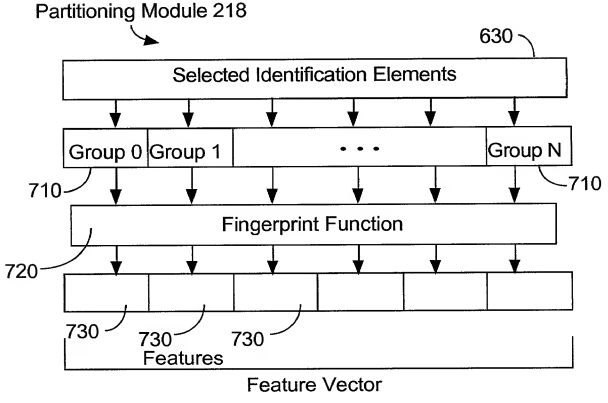
Partitioning Module 218
630
Selected Identification Elements
Group 0
Group 1
Group N
710
710
Fingerprint Function
720
730
730
730
Features
Feature Vector

FIG. 7

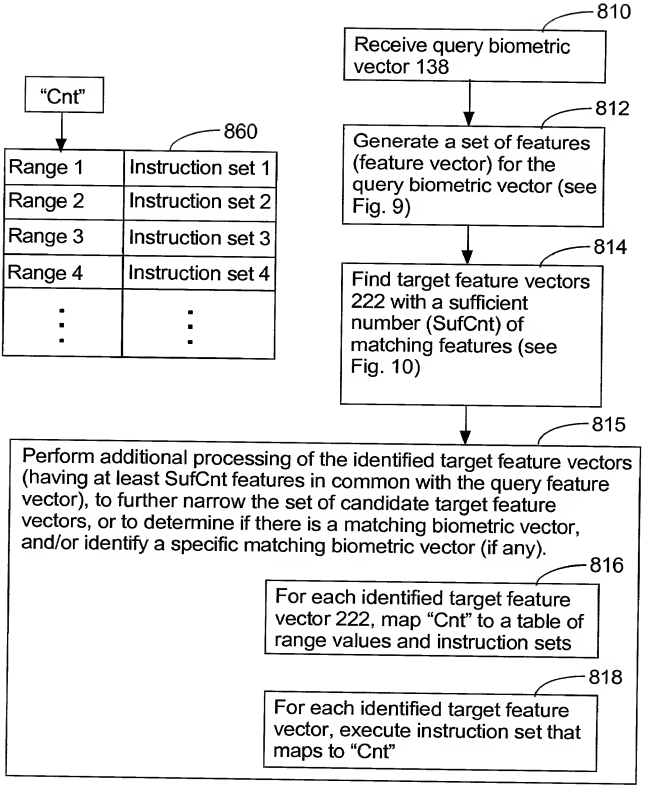
810
Receive query biometric vector 138
812
Generate a set of features (feature vector) for the query biometric vector (see Fig. 9)
814
Find target feature vectors 222 with a sufficient number (SufCnt) of matching features (see Fig. 10)
815
Perform additional processing of the identified target feature vectors (having at least SufCnt features in common with the query feature vector), to further narrow the set of candidate target feature vectors, or to determine if there is a matching biometric vector, and/or identify a specific matching biometric vector (if any).
816
For each identified target feature vector 222, map "Cnt" to a table of range values and instruction sets
818
For each identified target feature vector, execute instruction set that maps to "Cnt"
"Cnt"
860
Range 1
Instruction set 1
Range 2
Instruction set 2
Range 3
Instruction set 3
Range 4
Instruction set 4

FIG. 8

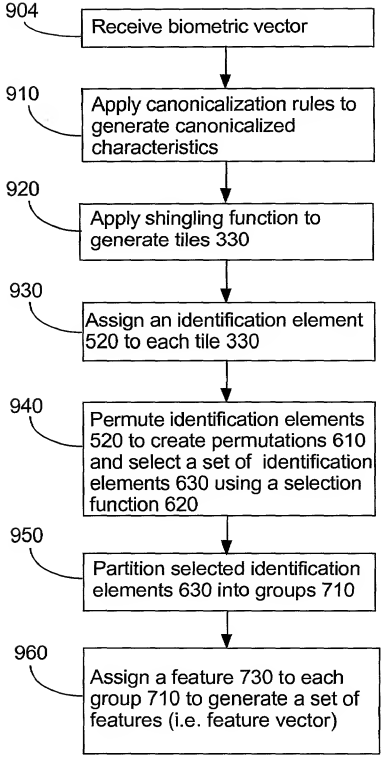
904
Receive biometric vector
910
Apply canonicalization rules to generate canonicalized characteristics
920
Apply shingling function to generate tiles 330
930
Assign an identification element 520 to each tile 330
940
Permute identification elements 520 to create permutations 610 and select a set of identification elements 630 using a selection function 620
950
Partition selected identification elements 630 into groups 710
960
Assign a feature 730 to each group 710 to generate a set of features (i.e. feature vector)

FIG. 9

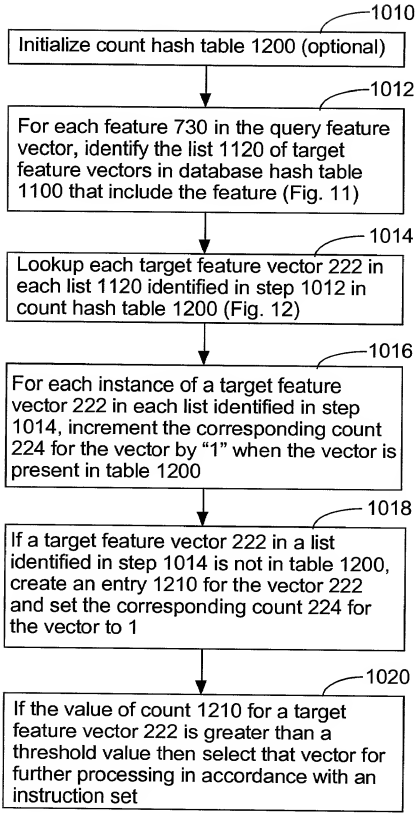
1010
Initialize count hash table 1200 (optional)
1012
For each feature 730 in the query feature vector, identify the list 1120 of target feature vectors in database hash table 1100 that include the feature (Fig. 11)
1014
Lookup each target feature vector 222 in each list 1120 identified in step 1012 in count hash table 1200 (Fig. 12)
1016
For each instance of a target feature vector 222 in each list identified in step 1014, increment the corresponding count 224 for the vector by "1" when the vector is present in table 1200
1018
If a target feature vector 222 in a list identified in step 1014 is not in table 1200, create an entry 1210 for the vector 222 and set the corresponding count 224 for the vector to 1
1020
If the value of count 1210 for a target feature vector 222 is greater than a threshold value then select that vector for further processing in accordance with an instruction set

FIG. 10

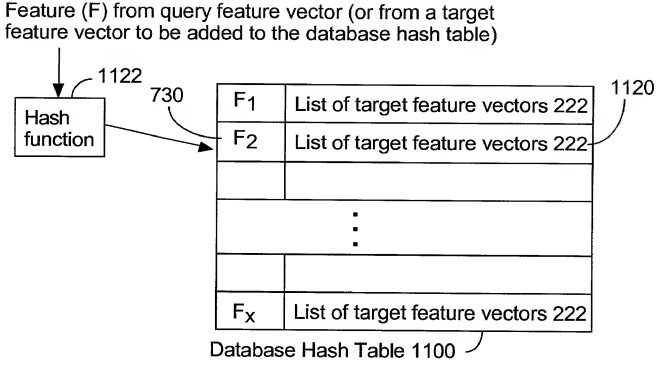
Feature (F) from query feature vector (or from a target feature vector to be added to the database hash table)
1122
Hash function
730
F1
List of target feature vectors 222
F2
List of target feature vectors 222
1120
Fx
List of target feature vectors 222
Database Hash Table 1100

FIG. 11

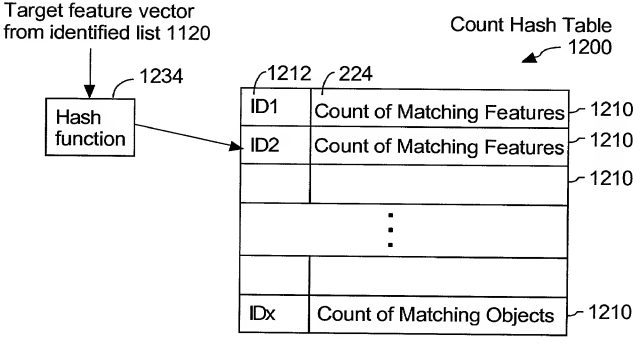
Target feature vector from identified list 1120
Count Hash Table
1200
1234
1212
224
Hash function
ID1
Count of Matching Features
1210
ID2
Count of Matching Features
1210
1210
IDx
Count of Matching Objects
1210

FIG. 12